

Abstract Submitted
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Solitary Ring Pairs and Non-Thermal Regimes in Plasmas Connected with Black Holes* BRUNO COPPI, MIT — The two-dimensional plasma and field configurations that can be associated with compact objects such as black holes are described, (in the limit where assuming a scalar pressure can be justified), by two characteristic non-linear equations: i) one that connects the plasma density profile to that of the relevant magnetic surfaces [1] and is called the “master equation”: ii) the other, the “vertical equilibrium equation,” connects the plasma pressure to the density and the magnetic surfaces and is closely related to the G-S equation for magnetically confined laboratory plasmas. Two kinds of solutions are found that consist of: i) a periodic sequence of plasma rings; ii) solitary pairs of rings. Experimental observations support the presence of rings around collapsed objects. Tridimensional configuration are found in the linear approximation [2] as consisting of trailing spirals. Observations of High Frequency Quasi-Periodic oscillations implies that they originate from 3-dimensional structures. The existing theory is extended to involve non-thermal particle distributions in order to comply with relevant experimental observations. *Sponsored in part by the U.S. DOE.

[1] B. Coppi, *Phys. Plasmas* **032901**, 18 (2011).

[2] B. Coppi, *A&A* **321**, 504 (2009).

Bruno Coppi
MIT

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